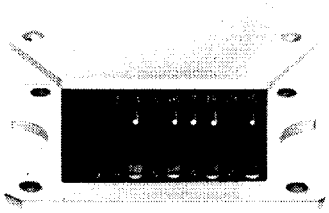
20 AMP, 270 WATT POSITIVE HYBRID VOLTAGE REGULATORS

LAS 5200



FEATURES

- 0.14% line regulation
- 0.2% load regulation
- 0.015% temperature coefficient
- Low noise
- Remote programming and remote sense
- Electrically isolated case

DESCRIPTION

The LAS 5200 Series of Power Hybrid Voltage Regulators is designed for applications requiring a well regulated, low noise, output voltage for load current variations up to 20.0 amperes. A key feature of the Power Hybrid Voltage Regulator is its construction. A high degree of thermal isolation between the heat generating power elements and the heat sensitive control and reference elements is achieved by placing the power section on the heat-dissipating base of the unit and the control state on the upper surface. This thermal isolation results in extremely low thermal drift characteristics for changes in power levels.

ABSOLUTE MAXIMUM RATINGS

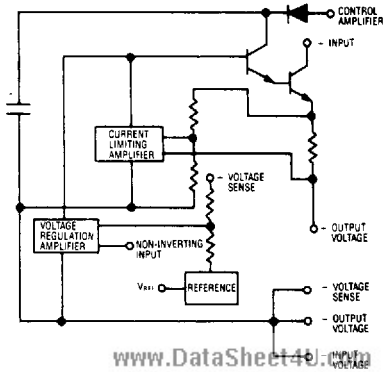
PARAMETER	SYMBOL	MAXIMUM	UNITS
Input Voltage	V_{IN}	40	Volts
Input-Output Voltage Differential	V_{IN}-V_O	28.6	Volts
Power Dissipation[1]	P_D	270	Watts
Thermal Resistance Junction to Case[2]	θ_{JC}	0.65	°C/Watt
Thermal Resistance Junction to Ambient	θ_{JA}	12.0	°C/Watt
Operating Junction Temperature Range[3]	T_J	0 to 200	°C
Storage Temperature Range	T_S	−55 to 125	°C
Lead Temperature (Soldering, 10 seconds)	T_{LEAD}	215	°C

(1)Output current vs. input-output voltage differential must be maintained per the Safe Operating Area curves.
(2)Case 1, heat-dissipating base.
(3)Darlington transistor, power section.

DEVICE SELECTION GUIDE

DEVICE	OUTPUT VOLTAGE (VOLTS)	OUTPUT CURRENT (AMPS)
LAS 5205	5	20
LAS 5212	12	15
LAS 5215	15	15
LAS 5224	24	14

BLOCK DIAGRAM



20 AMP, 270 WATT POSITIVE HYBRID VOLTAGE REGULATORS

ELECTRICAL CHARACTERISTICS

Input voltage test conditions are as follows: $V_1 = V_O + 7.2$ Volts, $V_2 = V_1 + 10$ Volts, or the maximum input, whichever is less.

Parameter	Symbol	Test Conditions			Test Limits			Units
		V_{IN}	I_O	T_J	Minimum	Typical	Maximum	
Output Voltage[1,2]	V_O	V_1 to V_2	0A to I_{RATED}	25°C	$0.93\|V_o\|$		$0.95\|V_o\|$	Volts
Voltage Differential[3] +Input (Pin 1) Control Amplifier (Pin 20)	V_{IN}-V_O V_{CNT}-V_O		$\leq I_{RATED}$	25-125°C	2.5 7.2		28.6 28.6	Volts
Line Regulation	$REG_{(LINE)}$	V_1 to V_2	0A	25°C			0.14	% V_O
Load Regulation	$REG_{(LOAD)}$	V_1	0A to I_{RATED}	25°C			0.2	% V_O
Quiescent Current Pin 1 Pin 20	I_Q	V_1	0A	25°C			 30.0 7.0	mA
Temperature Coefficient	T_C	V_1	0.5 I_{RATED}	0 – 125°C			0.015	%/°C
Programming Resistance	R_1					1000		Ω/Volt
Ripple Attenuation[4]	R_A	V_O + 10V	0.5 I_{RATED}	25-125°C	60			dB
Reference Voltage	V_{REF}			25°C		2.5		Volts

(1) Nominal output voltages and rated currents are specified under Device Selection Guide. $R_1 = 0\Omega$

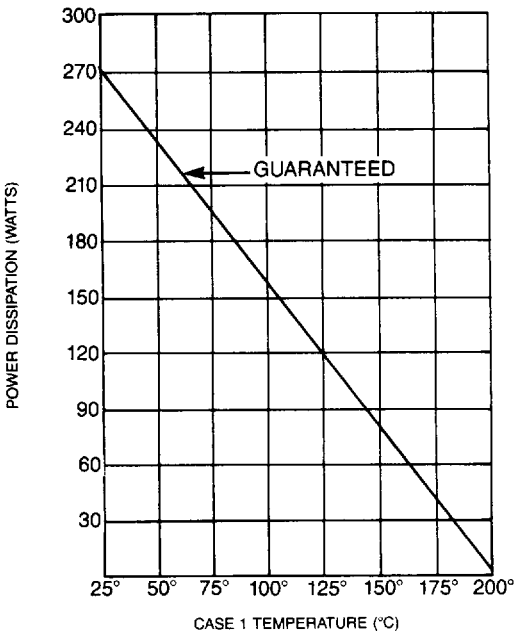
(2) The output voltage tolerance is adjustable; precise output voltage is set by external programming resistor.

(3) Power dissipation must be maintained per the Power Derating curve.
Output current vs. input-output voltage differential must be maintained per the Safe Operating Area curves.

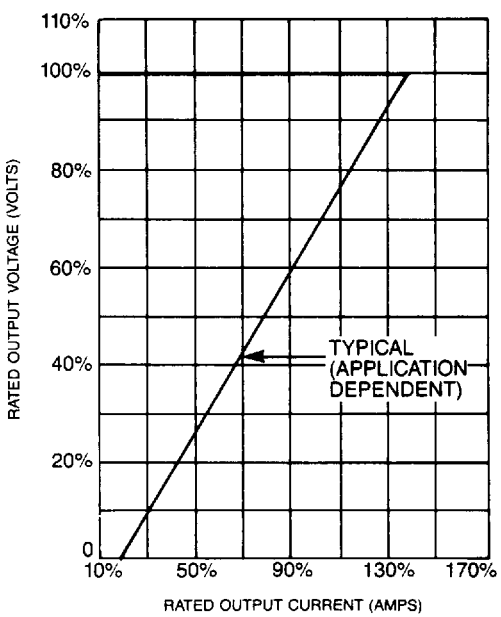
(4) Ripple attenuation is specified for a 1Vrms, 120Hz input ripple. Ripple attenuation is 54dB minimum for 24V model.

OPERATIONAL DATA

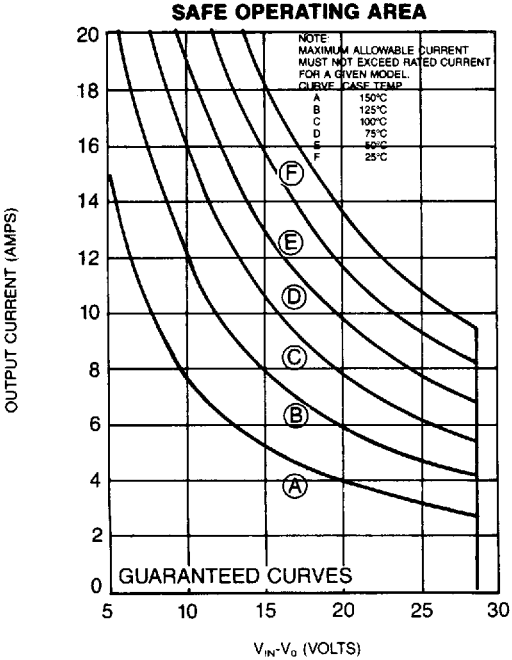
POWER DERATING



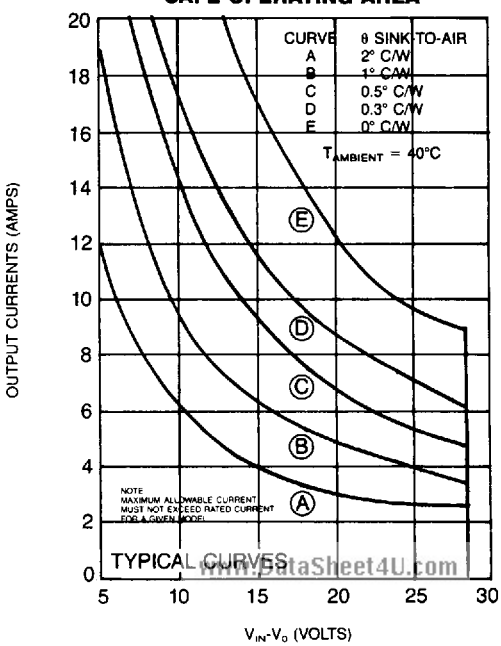
SHORT CIRCUIT PROTECTION



SAFE OPERATING AREA



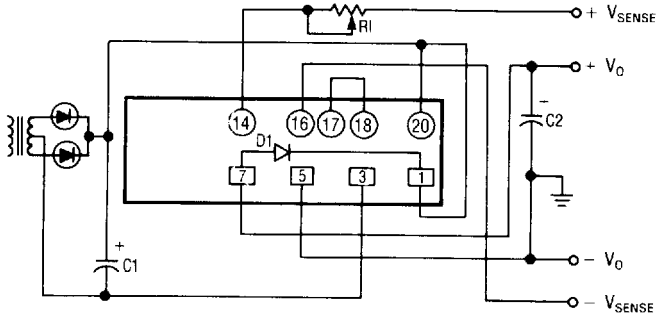
SAFE OPERATING AREA



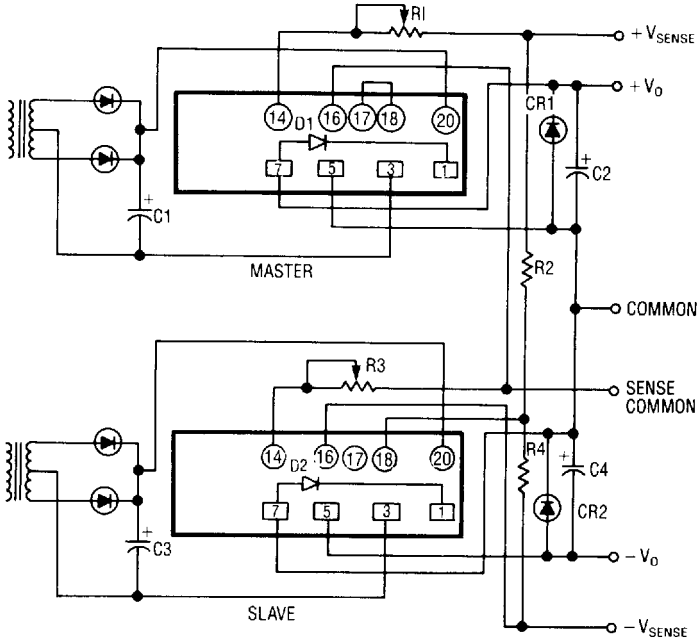
20 AMP, 270 WATT POSITIVE HYBRID VOLTAGE REGULATORS

TYPICAL APPLICATIONS

POSITIVE VOLTAGE REGULATOR[1,2,3,4]



DUAL TRACKING VOLTAGE REGULATOR[1,2,3,4,5,6]



[1] Minimum value of input filter capacitors:
C1, C3 = I_o X 1000μF/Amp

[2] Minimum value of output capacitors:
C2, C4 = I_o X 100μF/Amp

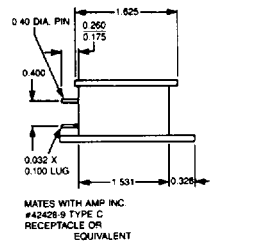
[3] External diodes D1, D2 provide reverse bias protection.

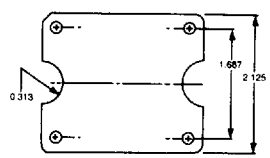
[4] A 0.22 to 100μF capacitor connected between pins 3 and 20 is recommended for lead wire compensation.

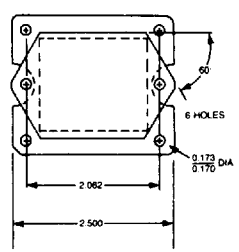
[5] Values of tracking reference voltage divider resistors R2 and R4:
R2 = (2000V_o – 2490)Ω, ± 1%, ½ W film
R4 = 2.49kΩ, ± 1%, ½ W film

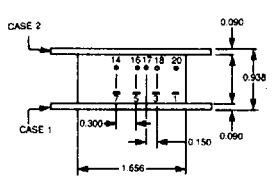
[6] Rectifiers CR1 and CR2 should be rated at peak inverse voltage of 50V and forward current minimum equal to maximum rated output current.

DEVICE OUTLINE









1	(+) Input Voltage
3	(−) Input Voltage
5	(−) Output Voltage
7	(+) Output Voltage
14	(+) Voltage Sense
16	(−) Voltage Sense
17	Reference Voltage
18	Non-Inverting Input
20	Control Amplifier